♀), an Æthiopian Wart Hog (*Phacochœrus æthiopicus*, ♂), a Banded Ichneumon (*Herpestes fasciatus*), a Milky Eagle Owl (*Bubo lacteus*), a Black-crested Eagle (*Lophoaëtus occipitalis*), a Marabou Stork, (*Leptoptilus crumeniferus*), two Green-necked Touracous (*Corythaix chlorochlamys*), two White-crested Touracous (*Corythaix albo-cristatus*), a Bell's Cinixys (*Cinixys belliana*) from British Central Africa, presented by Mr. H. H. Johnston; a Black-faced Kangaroo (*Macropus melanops*, ♂) from Australia, presented by Dr. G. Lindsay Johnson; a Black-headed Conure (*Conurus nanday*) from Paraguay, presented by Mr. A. Harrison; a Golden Eagle (*Aquila chrysaëtos*) from Scotland, presented by the Maclaine of Lochbine; a Stump-tailed Lizard (*Trachydosaurus rugosus*) from Australia, presented by Capt Jamieson; a Maholi Galago (*Galago maholi*) from South Africa, an Arabian Gazelle (*Gazella arabica*, ♂) from Arabia, an Indian Gazelle (*Gazella bennetti*, ♀) from Persia, a Lioness (*Felis leo*) from East Africa, a Military Macaw (*Ara militaris*) from South America, deposited; a White-tailed Gnu (*Connochætes gnu*), three Ypecaha Rails (*Aramides ypecaha*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE NATIVE CALENDAR OF CENTRAL AMERICA AND MEXICO.—The native races of Mexico and Central America used a calendar differing completely from those employed by the ancient nations of the Old World to reckon time. Many explanations of the origin of the calendar have been suggested, some referring it to series of recurring events in nature, others to astronomical phenomena, while a third section of inquirers regard it as purely mythical and terrestrial. Dr. D. G. Brinton has lately studied the peculiar calendar from the point of view of linguistics and symbolism, and his results are given in the *Proceedings* of the American Philosophical Society, vol. xxxi. p. 258, 1893. As the calendar system investigated is not widely known on this side of the Atlantic, it may be well to give an outline of it. "The basis is a so called 'month' of twenty days. Each day is designated by a name of some object, animate or inanimate, and besides its name, each day is numbered, but not from one to twenty, but only from one to thirteen, when the numbering begins again at the unit. The result of this combination evidently is, that a day bearing both the same name and the same number will not recur until thirteen of the 'months' have elapsed. This gives a period or cycle of 260 days, and this anomalous period is at the foundation of the native calendar." Dr. Brinton's linguistic analysis of the names of the twenty days in the Maya, Tzental, and Quiche-Cakchiquel dialects, and in the Zapotec and Nahuatl languages, shows that they are all identical in signification, and therefore must have had one and the same origin. By arranging the symbols represented by the day-names in order from one to twenty, it is found that they exhibit a sequence covering the career of human life, from the time of birth until death at an old age. Thus, in all the five languages and dialects, the name of the first day signified birth or beginning, that of the tenth day, success (through hardship and suffering); of the eleventh, difficulties surmounted; of the thirteenth, advancing years; of the eighteenth, war and death; of the twentieth, the sun, or house of the soul. It appears, therefore, that the calendar conveyed a philosophical conception of life; which may or may not, however, have originated contemporaneously with it. The period of twenty days was doubtless derived from the vigesimal system of counting in use among the tribes employing the calendar. This number 20 is based on finger-and-toe counting, and Dr. Brinton points out that in the languages investigated its name has the signification "completed" or "filled up." "In this way," he thinks, "the number came to represent symbolically the whole of man, his complete nature and destiny, and mystically to shadow forth and embody all the unseen potenesis which make or mar his fortunes and his life." Each of the twenty signs in the primitive calendar had 13 numbers, and also 13 names, or rather 13 varieties of the same name. Apparently the ancient seers of Mexico and Central America believed that by assigning thirteen modes of activity to each of the twenty headings under which the agencies that influence human life were arranged, they had taken into account the thirteen possible relations of each to both the material and immaterial worlds; and the fact that the result of 20 × 13 days is 260 days or approximately nine months, that is, the period from conception to birth, would, according to Dr. Brinton, have appeared to confirm the mystic potenesis of these cardinal numbers. But whatever theory is accepted to account for the adoption of the factor 13, there is little doubt that this period was posterior and secondary to the 20 day period.

THE APPEARANCE OF THE HELIUM LINE.—M. A. Bélopolsky contributes to the *Memorie delle Società degli Spettroscopisti Italiani* for May an account of some observations made by him on the apparent reversal of the Helium line, D_3. He noticed, while observing solar prominences, that this bright line frequently appeared double and contained a dark line, not running down its middle, but nearer to one edge than the other. A close investigation on several occasions showed that the one-sided appearance was not produced by instrumental defects. And since it was found that the line was sometimes visible, while at other times it could not be detected, M. Bélopolsky concluded that it was produced by absorption in the earth's atmosphere. The fact that the line did not split D_3 in halves, and that a second similar line could sometimes be seen, indicated that the appearance was not merely one of reversal. To locate the positions of these dark lines, the third order of a spectrum produced by a Rowland grating having 14,438 lines to the inch was employed. It was then found that the bright badge of Helium was almost exactly in the middle of two fine lines, of which the one near the redward side was double. Their telluric origin was evidenced by their absence on one occasion when the air was very dry and the temperature – 4° C. At other times, when the atmosphere was full of moisture, and the temperature comparatively high, the lines were perfectly seen. With a spectroscope of small dispersive power, the double line on the red edge of D_3 appears as a single line stronger than the really single line on the violet side, which can only be seen under good observing conditions. M. Bélopolsky gives the following wave-lengths of the lines, on the Potsdam scale: 587·65 (double), 587·60 (D_3), 587·58.

EPHEMERIS FOR TEMPEL'S COMET.—In continuation of the ephemeris for Tempel's periodic comet, given in these columns on May 31, the following ephemeris for Paris Midnight (from *Astr. Nach.* 3229) shows the positions of the comet until the middle of August:—

1894.	R.A. h. m. s.	Decl. ° ′
July 1	2 16 48	3 15
5	2 26 5	3 34
9	2 35 2	3 50
13	2 43 39	4 3
17	2 51 55	4 14
29	3 14 34	4 30
Aug. 2	3 21 20	4 29
6	3 27 41	4 26
10	3 33 36	4 21
14	3 39 4	4 13

The comet is in Cetus, and is moving towards Taurus. It will pass about a degree to the north of α Ceti in the middle of July.

THE RECENT DISCOVERY OF FOSSIL REMAINS AT LAKE CALLABONNA, SOUTH AUSTRALIA.[1]

II.

GEOLOGY.

FOR what I have to say under this head I must express my obligations to my colleague, Prof. Tate, whose observations in Australia have now extended over many years. He has recently summarised the whole history of its geological progress in a very able presidential address to the Australasian Association for the Advancement of Science, and I have had no hesitation in quoting freely from this and from other writings of so competent an observer.

There appears to be no doubt, both from geological and biological reasoning, that in the Lower Cretaceous period a great part of Central Australia was covered by a sea which extended from the Gulf of Carpentaria to the Great Bight, and so divided the continent into an eastern and western moiety. Following this, an upheaval of the sea-covered area took place, succeeded by a denudation of the cretaceous deposits. Unequal movements of depression then brought about lacustrine conditions on portions of the now uplifted bottom of the old sea strait and, in other portions, permitted of the admission of the waters of the ocean. Finally a general upheaval, followed by utter desiccation, placed the deposits of the period just concluded in nearly the condition as that in which we now find them.

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[1] By Dr. E. C. Stirling, F.R.S., C.M.G., Hon. Director, South Australian Museum. (Continued from page 183.)

The systems of existing lakes, which have been mentioned in an earlier part of this paper, are evidently the shrunken remnants of the much larger lacustrine area of Pliocene times—a condition which demanded for its existence a much greater rainfall than now exists, and was contemporaneous with that which gave rise to the glacial phenomena at places in more southern latitudes in Australia. The region of Lake Eyre was then, as now, the centre of the inland continental drainage. Towards this depression are directed many dry water-courses, of which those of the Macumba, Finke, Cooper, and Diamantina are the chief. For miles around extends an area of sand-hills, separated by loamy interspaces, which are littoral sand-banks marking the successive changes in the contraction of the waters. Within its basin the Pliocene sands and loams have yielded further proof of its lacustrine origin in the remains of Diprotodon, Turtle, Crocodile, and Ceratodus.

In Prof. Tate's opinion, Lake Torrens may have belonged to a lacustrine area distinct from that of Lake Eyre, as with the existing contour of the country a submergence of at least four hundred feet would be necessary before the two systems could be connected.

Such a submergence would also unite in a vast inland sea the whole of the lake region around Lake Eyre and to the westward of Lake Torrens. A very much less considerable submergence would connect Lake Eyre with Lake Frome and the lakes to the north of it. Much of the Murray Desert to the eastward of Overland Corner, and perhaps the whole Riverine region, was at this time a lacustrine area, though probably disconnected from those of Lakes Eyre and Torrens.

The following table, based on Mr. Hurst's report, and revised by Prof. Tate, represents approximately the classification of the formations of the district:—

Recent.—Loose sand generally forming low ridges, sand-hills, or dunes overlying in places the Pliocene beds.

Pliocene.—Lake Callabonna; fossiliferous formation.
Bands of unctuous blue clay containing abundant quantities of saline minerals and concretions of carbonate of lime; thin seams of sand; inflorescent deposit of salts upon the surface. Fossils: Extinct Mammals, Birds, a fresh-water Mollusk (*Potamopyrgus*, sp.), Entomostracans, and a few plants of living species (*Charæ* and *Callitris robusta*).

Mesozoic.—(*A*) "Desert Sandstone" or Upper Cretaceous (hard quartzites or porcellanized sandstone, gritty sandstones, and conglomerates). Fossils: Dicotyledonous leaves. (*B*) "Rolling Downs" formation or Lower Cretaceous; shales with fossiliferous limestone bands.

Azoic.—Metamorphic schists.
Clay slates, mica, talc, and hornblende slates, metamorphic and intrusive granite and greenstone.

The Pliocene formation in which the extinct Marsupials occur does not appear to be restricted to the present boundaries of the lake, since wells, sunk a considerable distance from the present shore, have yielded fragments of bone in exactly the same formation, thereby showing that the lacustrine area, in Pliocene times, occupied a larger area than at present.

The Mesozoic formation is limited upon the surface to a line of outcrops along the eastern slope of the Flinders Range. At Parabana, Pepegoona, Hamilton and Paralana Creeks, these beds occur as the edges of an immense mesozoic basin which underlies Lakes Frome and Callabonna. The detritus of this formation forms the stony table-lands and plains of the country, and the, so-called, stony deserts of the early explorers have their origin in the same formation.

The Azoic rocks are restricted to the Flinders Range, and are of doubtful age. These rocks were pierced by the Government boring party at Lake Frome several years ago, while boring through the Post-tertiary and Mesozoic formations in search of artesian water.

FOSSILIFEROUS AREA.

The area that has been more or less well explored, is not more than a mile long by about half to three-quarters of a mile wide, but this forms but a small portion of the fossiliferous ground. Bones were dug up at the springs lying in the lake bed eight miles to the north of the camp, and were observed on the surface in a very weathered condition all along the track thither. In fact Mr. Zietz informs me that traces of bones and teeth exist on the surface in almost every part of the lake he examined. Nor, as has been said, are they restricted to the present boundaries of the lake.

SURFACE SKELETONS.

One very remarkable feature is the existence of surface skeletons, indicated by the presence of concretionary limestone, or travertine, which has formed for the bones a sort of cast, elevated a few inches above the surrounding level. In some cases the relative position of the bones has been preserved to such an extent that the limestone mass presents a striking outline of the form of the skeleton. Usually in such cases the animal is lying on its side with the head and limbs plainly visible and more or less extended. The actual osseous substance has, in many of the bones of these surface skeletons, completely disappeared, but not however in all cases, some of them, usually the limb-bones, are more or less imperfectly preserved and devoid of concretion. Several of these surface skeletons existed near the camp at the time of my visit, but Mr. Zietz informs me that after the drying up of the rain which then fell they were no longer visible, having been covered up by the general saline encrustation which has previously been spoken of.

CONDITION OF THE BONES.

The condition of the bones varied very much; some were so friable that they crumbled into powder and could not be removed; others, usually in moist places, were wet, soft, and of the consistency of putty. Curiously enough, for reasons which are not clear, some bones from wet places were firm and hard, while others from ground that was comparatively dry were soft. As a rule, those in best condition came from localities which, without being too wet, were moderately damp. The bones, thus varying in condition and consistency, required very different methods of treatment. The greatest difficulty was undoubtedly due to the circumstance that the bones were saturated with what was practically a concentrated saline solution. In fact, all their cavities were so filled with this fluid that it was necessary to allow a considerable time for it to drain away. In other cases the bones were encrusted and impregnated with gypsum crystals. From such causes the bones became in dry weather brittle and liable to break or crack, and in damp weather difficult to dry. Very careful and patient methods of treatment had consequently to be adopted, and will still be necessary until the salt is removed.

When dry, the fractured surfaces adhere strongly to the tongue, and an approximate chemical examination, by Mr. Turner, of a clean piece of Diprotodon bone gave the following composition:—

Substance dissolves almost entirely in dilute hydrochloric or nitric acids. Contains—

Moisture	3·76	per cent.
Organic matter	7·4	,,
Inorganic matter, mainly phosphate of lime with some carbonate	88·84	,,
Total	100	

POSITION AND ATTITUDE OF SKELETONS.

The heads were pointed towards all directions, and the remains of different animals frequently much mixed. Where, however, the bones of an individual were lying in juxtaposition they preserved fairly constant relations to one another. The vertebræ, for instance, often formed a more or less continuous series or were broken up into segments, of which the constituents were in such close apposition that they could be removed entire. These bones and the head, which was often much flattened laterally, as if by pressure, were usually lying either in their proper position with the dorsal surfaces uppermost, or were turned over on their sides. The pelvis was usually horizontal; of the ribs, some were *in situ*, others either widely separated from their fellows, or several firmly welded together. The limbs, almost invariably at a greater depth than the rest of the skeleton, had their various segments greatly flexed. The feet were deepest of all. This attitude, together with the frequent approximation of the bones of individual skeletons, is, as has been observed, strongly suggestive of death *in situ* after being bogged. A very similar attitude was assumed by the camels on the occasions when they got bogged in crossing from the sand islets to the main land.

The four Birds whose remains were found close to the camp had their heads all pointing to the south-west, that is towards the part of the lake-bed considered to be the deepest, but their bones, especially the ribs and short bones, were much broken and mixed together. The larger bones, however, were well preserved, and in one skeleton the cervical and dorsal vertebræ formed a continuous series. It was, unfortunately, only possible to secure two heads, and these, though apparently entire, were so soft and fragile that they had to be set immediately in a half-mould of plaster of Paris.

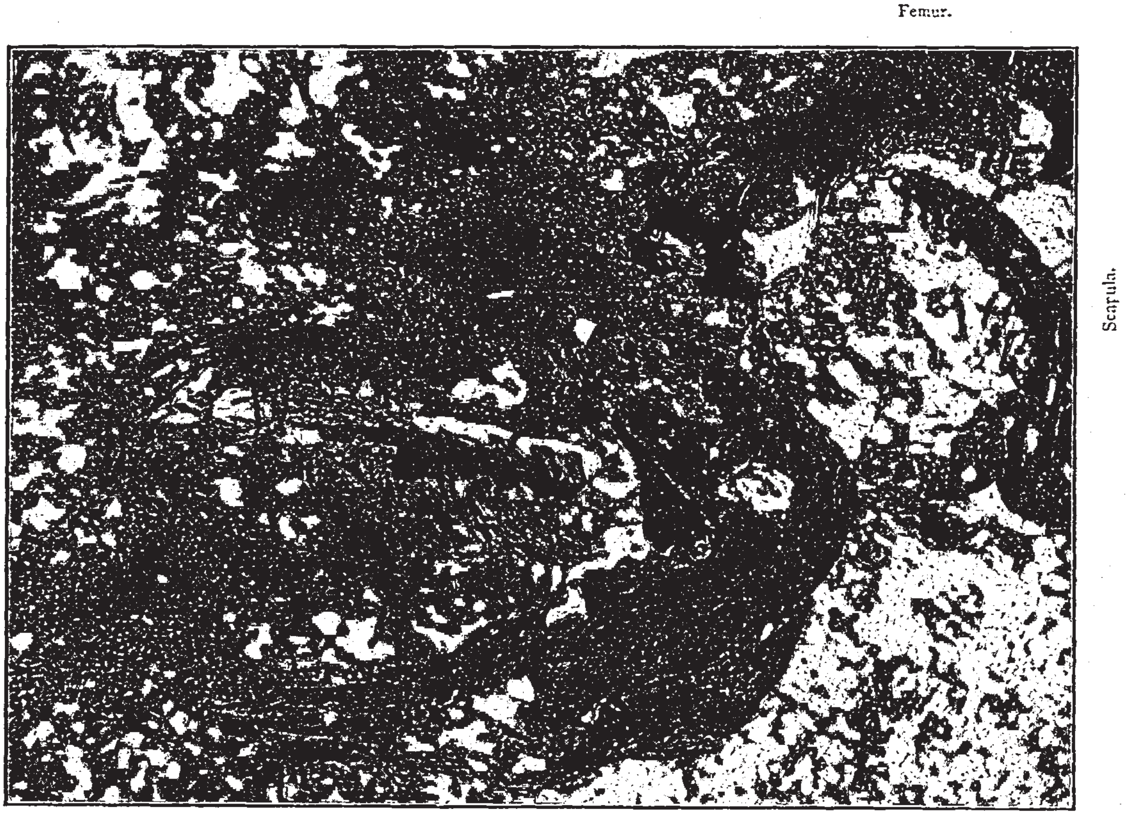

FIG. 2.—Head of Diprotodon. (Lying in clay matrix which has been partially removed.)

The position of the Bird-remains were here, as elsewhere, indicated by the presence of circular surface patches of "gizzard-stones," consisting of fine and coarse sand and small siliceous pebbles not exceeding three-quarters of an inch in diameter, the surfaces of which were smooth and worn as if by attrition.

The stones comprised in one entire patch weigh fourteen ounces, and include examples of siliceous sandstone, jasper, clay-stone, blackened on the outside, black quartz, clear quartz, chalcedony, together with a few fragments of blue brittle clay with worn edges. Such stones are not now found on the Flinders Range, but are characteristic of the great Central Australian plain formation, which extends from the Lake Eyre basin across the continent to the Gulf of Carpentaria.

Such pebbles occurred either scattered or in groups at various places in the lake, and were the only stones of any kind to be found anywhere on its surface. The only shell found in the clay matrix of the bones was a minute fresh-water Mollusk (*Potamopyrgus* sp.). Three fruits, however, of a *Callitris* determined by Prof. Tate to be *C. robusta*, a species now living, were found embedded in the same blue clay, and some fructifications of *Charæ* were washed out of it.

FOOD REMAINS.

Associated with the skeletons of Diprotodon, in a relative position which corresponded with that of the abdominal cavity, were occasionally found loosely aggregated globular masses of what I judge to be the leaves, stalks, and smaller twigs of some herbaceous or arboreal plants. The fragments are very uniform in length, thickness and character, rarely exceeding an inch in length or a line in thickness. They are solid, often irregularly branched, frequently retaining portions of the bark, and have their ends often frayed or crushed as if by the action of teeth. Microscopic examination showed the structure of the sclerenchyma tissue to be well preserved, and gave clear indication of the existence of dotted ducts, but I could find no trace of leaves that might have indicated a diagnosis. Judging from this entire absence of leaves and from the degree of maceration, or entire absence of the bark, these masses probably represent the contents of the intestines. No traces of coprolites were anywhere met with.

I have submitted a sample of these food remains to Baron von Mueller, who recommends that it should be sent to Prof. Radlkofer, of Munich, whose special investigations in xylography may enable a more accurate determination to be made.

MATERIAL OBTAINED.

At the present time it is impossible to give more than a very bare outline of the extent of material obtained. In the first place, more than a third (and that the best) of it has not yet reached Adelaide, nor can do so for another month, and the unpacking of what has already arrived has only just been completed. On the field itself there was no time or means for careful examination and comparison, Mr. Zietz very rightly understanding his duty to be that of gathering in and of preserving as much material as possible while conditions, which might at any time alter, were favourable for work. In this and in the all-important work of careful labelling and packing, his time was fully occupied as long as daylight lasted, and as soon as the bones were sufficiently hardened they were packed up so as to be out of harm's way; consequently, the opportunity has never yet occurred of examining the collection in the aggregate.

Mr. Zietz is, however, confident that he has one fine skeleton of the large *Diprotodon australis* complete, and a second nearly so. The indications afforded by differences in the shape of the skull and other bones, together with the great variation in size, shape and section of the great upper incisors, render it probable that, even among the moiety of specimens already unpacked, there are at least three or four species of large Diprotodontoids represented.

We have nearly a dozen heads in good or fair condition, either intact or in pieces which can be put together; a very extensive series of limb bones, including some perfect feet removed entire with their envelope of clay, which, in some cases, will be found to show the impressions of the soles.

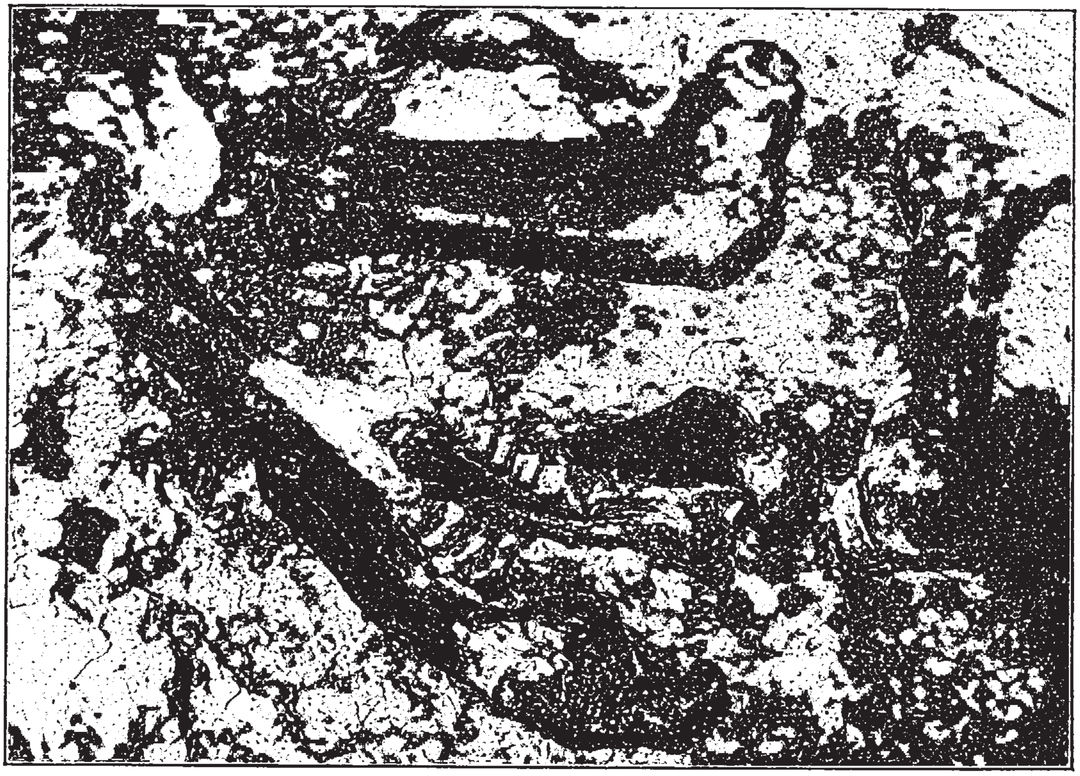

FIG. 3.—Diprotodon bones partially excavated.

Of the feet, in which from our previous ignorance of their constitution much interest is centred, I prefer not saying much at present. Among the first consignment of bones brought down by Mr. Hurst, were the supposed bones of a fore and hind foot, but a careful examination of them satisfied me that they were not only incomplete, but that the assigned constituent bones did not all belong to the same individual, or possibly even to the same species. When at Lake Callabonna I made a further attempt to ascertain their structure from apparently untouched and entire specimens, but the wet weather had made the bones so exceedingly soft and fragile, that they collapsed under the gentlest handling, and I was consequently unwilling to risk further damage. Several of those we have were removed without disturbance of the enveloping clay, and are presumably complete, but the clay has now, with exposure, become so hard that they require for development more time than we have been able to devote to them under our present great pressure of work. Besides, there are many other bones the condition of which demands more immediate attention, so that I fear the feet must wait. There are hundreds of separate carpal, tarsal, metacarpal and phalangeal bones, many ribs, several more or less perfect pelves, and a very few marsupial bones. The vertebræ are the weakest point in the collection, as these are usually in bad condition or broken, and, in all cases, they were very difficult to remove and to prepare without further damage. Several small bones, which are almost certainly those of a very young Diprotodon, were found by Mr. George Hurst in such a position relative to the pelvis of an adult animal as to suggest that the parent had died with a young one in its pouch. Other such bones were found by one of Mr. Zietz's party. Of an apparently smaller species of Diprotodon, possibly *D. minor*, we have several heads and many other bones.

How many separate individuals of Diprotodon have been met with it is difficult to say with accuracy, on account of the way in which they were often scattered and mixed, and the fact that the work of Mr. Zietz overlapped that of his successor, but it would probably be safe to say that there was some indication or other of the existence of at least 100 distinct animals.

Remains of a large Wombat, which appears without doubt to be *Phascolomys gigas*, were very scarce; most of the bones of the appendages, however, are represented more or less perfectly, as are also the marsupial bones. Unfortunately we have only fragments of two skulls, of which one can be made fairly complete when the pieces are put together. There appears no doubt but that the adze-like teeth, described by Sir R. Owen as those of *Sceparnodon*, belong really to this animal, as anticipated by Mr. Lydekker ("British Museum Catalogue of Fossil Mammalia," part v.). The name, however, is a misleading one, as the animal could not have exceeded three feet in height, though the bones are very massive.

Of fossil Kangaroos we have one small but very complete skeleton, and a large series of separate bones of several larger kinds, including a fairly complete skull, which has a length of 33·5 cm.

Of *Nototherium*, so far as we are aware, no remains have been met with, unless, perhaps, some teeth which differ from the ordinary type of those of Diprotodon may prove to be referable to this animal.

Besides the above, which constitute the bulk of the mammalian specimens, there are old bones and fragments of bones belonging to some, as yet, undetermined small animals.

Of the great Birds which appear to be all of one species, and of nearly one size, we have, as stated, two skulls of extraordinary size, in passable condition; but as these have not yet been developed, it is not possible to give their characters or exact measurements. They, however, certainly exceed eleven inches, and possibly reach twelve inches, in length. There are besides three pelves, one sternum, a whole vertebral series, including the tail, several ribs, two partially complete sets of wing bones, and a dozen or more legs complete, so that the collection probably comprises nearly all the bones of the skeleton. The femur is of the same massive build as that of *Dromornis australis*, and even exceeds it in size. Moreover, so far as can be judged from description and plates, it differs from it in contour and section, which is greatly compressed antero-posteriorly, and in some other particulars. The differences between the two tibiæ are also considerable, especially in respect of the existence in the new fossil of a bony ridge across the precondylar groove. The proximal end of the femur differs also from the fragment assigned by Mr. De Vis to *Dinornis queenslandiæ*, but not accepted as such by Captain Hutton. Apart from the vast differences of proportion, the leg-bones of the new fossil have many points of resemblance to those of *Dromæus* in the disposition of salient anatomical features, a similarity which has been noted by Sir R. Owen in the case of *Dromornis*. The foot (relatively small, when compared to that of *Dinornis elephantopus*) is tridactyl, the outer toe appearing to possess only four phalangeal segments.

The following measurements present, roughly, a comparison between the dimensions (reduced to the metric system) of the femur of Owen's *Dromornis*, as stated by him (*Trans. Zool. Soc.* vol. viii. p. 381), and one of the largest of the femora of the Lake Callabonna fossil.

—	Extreme length.	Lat. diameter at middle-third.	Antero-posterior diameter.
	cm.	cm.	cm.
Dromornis australis	29·2	6·4	4·0
Lake Callabonna bird	35·1	7·9	6·2

A further idea, also, of the comparative proportions of the various segments of the leg may be gained by reference to the subjoined table, in which the comparison is made between the legs of a *Dinornis elephantopus* in the South Australian Museum, the Lake Callabonna fossil, and a large Emeu (*Dromæus novæ hollandiæ*):—

—	Femur.		Tibic-Tarsus.		Tarso-Metatarsus.		Middle toe.
	Extreme length.	Girth at mid-point.	Length.	Girth.	Length.	Girth.	Total length.
	cm.	cm.	cm.	cm.	cm.	cm.	cm.
Dinornis elephantopus . . .	30·8	16·5	51·2	14·6	22·2	14·0	18·3
Lake Callabonna Fossil . . .	35·1	23·3	61·3	17·2	37·8	12·8	15·3
Dromæus novæ hollandiæ . .	21·2	9·8	43·6	8·0	37·4	7 5	14·6

The combined lengths of the three principal segments in the Callabonna fossil thus exceed those of the Emeu by more than a foot, and those of *D elephantopus* by about the same amount.

Of the wing we fortunately possess two examples, one wanting only in the phalangeal portion, the other more imperfect. Comparing it with this appendage of the same Emeu, whose humeral and radio-ulnar segments are respectively 10 cm. and 7·5 cm. in length, I find that the corresponding segments of the fossil bird are 8·9 cm. and 10 cm. and considerably thicker.

The remaining bird-bones are in the collection which has yet to reach Adelaide, and I can therefore give no particulars of them from personal observation. There can, however, I think, be no doubt, even from the above limited observations, that these bird-remains indicate the former existence of a large extinct struthious bird distinct from either *Dromornis* or the *Dinornis queenslandiæ* of De Vis.

It is estimated that altogether about three to four tons net weight of bones have been, so far, obtained.

Although the most careful search was constantly made, no traces whatever of *Thylacoleo* were discovered, which, under the circumstances, is rather remarkable if the habits of this beast were as predatory as is believed by some. Its remains have, however, been found in other parts of South Australia, associated with those of Diprotodon. Nor were there any signs of the contemporaneous presence of man.

METEOROLOGICAL.

Arriving at the camp on August 16, the party experienced fine weather, but very cold nights for about a week. Strong winds, mostly south-easterly but veering in all directions and increasing in strength for about twenty four hours and eventually subsiding, then became of frequent occurrence. Later on, towards the end of October, these gales, now usually from northerly quarters, increased in force and frequency, beginning at any time in the day and lasting twelve to eighteen hours, carried dense clouds of fine sand from the dunes, and pulverised saline matter from the lake, and were most irritating to the eyes.

In November these gales blew almost continuously and with still greater force, raising sand-storms so dense that it was impossible to see more than a few yards, and work was consequently impossible. Empty cases, and even the bones laid out to dry, were blown about the camp, sometimes to a distance of a hundred yards. The nights were intensely dark. Heavy clouds to the northwards seemed to threaten rain, but none came for some days. These clouds appeared to separate at the northern end of the lake, to travel southwards on each side of it, and then to unite again. Mr. Ragless, at Callabonna, was convinced that in some way or another the lake bed was an obstacle which the rain clouds from the west did not readily pass. During the day the heat was often intense, the thermometer in the tent rising frequently to 110° F. or not unfrequently even to 120°, but the nights were still comparatively cool. Innumerable flies were, in the day-time, a constant and maddening source of annoyance to man and beast, and so tortured the camels that the margin of their eyelids became quite raw. About the middle of November there was heavy rain for eighteen hours, and a week later a severe sand-storm from the west, bringing a sharp thunder-shower, in which an inch fell in a quarter of an hour, and its impact on the surface of the lake was so heavy that it could be heard at Callabonna Station six miles distant. A fortnight later a second severe sand-storm from the west was followed by another heavy shower. Just previous to the latter rain large flocks of the Australian Swift, *Cypselus australis*, locally called rain-birds, and considered to be a sure sign of heavy rain, passed over the lake. On one night only was there a fog, which was of such peculiar denseness that the candle in the tent threw hardly any light, and its flame appeared surrounded by a yellow halo.

Previous to heavy weather immense numbers of nocturnal insects came round the camp fire at night, and a large collection of them was made.

RABBITS.

During November the camp became almost unbearable from the stench produced by the dead carcases of rabbits which came to drink of the waters of a very brackish, in fact salt, spring at the base of the sand-hill, about a hundred yards from camp. Round this they died after drinking, or else perished after crawling for shelter into the tents and empty boxes. It became part of the routine of the camp to bury upwards of fifty bodies every night, but still the nuisance was hardly lessened. The rabbits also caused many bones to be broken by crawling under them in search of little pools of salt water which dripped from them as they were laid out to dry. In their frantic search for water they gnawed holes in the water-bags in camp, and on the mainland bit through the stems and roots of the "needle-bush," a species of *Hakea*. In one night at Callabonna Mr. Ragless killed 1400 with poisoned water, and what with drought and the ravages of these pests, which stripped the scanty bushes of every green leaf till they were nothing more than bundles of bare sticks, the surrounding country presented an appearance of desolation that defies description.

Under such circumstances of heat, sand and effluvia, it is not surprising that the health of the party suffered eventually from ophthalmia and gastro-intestinal complants, and, indeed, it was chiefly this which led to the breaking up of the camp at the end of November for the time being.

It would be an unworthy omission if I were not finally to acknowlege the cheerfulness and skill with which Mr. Zietz performed his duties under somewhat arduous and depressing circumstances; indeed, whatever satisfactory results may have been achieved by this expedition they are most chiefly due to his indefatigable zeal in the interests of palæontology and of his museum. To the Messrs. Ragless our best thanks are due for their kindness and hospitality to members of the party at various times, and for many necessary articles supplied, sometimes, I fear, at their own inconvenience. Our great obligation to the Government of South Australia for the loan of camels, granted through the mediation of Mr. Goyder, the Surveyor General, I have already acknowledged.

For the preceding notes I can only claim that they comprise but a rough and imperfect epitome of the physical features of the fossiliferous area, and of the conduct of the Museum party's operations up to the present time. As has been already stated, until the whole of the specimens have been unpacked, cleaned, mended, examined and compared, no accurate summary of the palæontological results can be given. It must further be remembered, that the South Australian Museum has recently shared in a general retrenchment imposed upon all Government institutions by the financial exigencies of the day, and that at this very time when the limited museum staff is called upon to deal with, for it, an unprecedented mass of material, it is also called upon to remove and re-arrange, with expedition, the whole of its collection in a new and more commodious building. I mention these facts as a plea for some indulgence for the delay that must inevitably take place, even with such collaboration as we may hope to secure, before the full scientific results can be made known.

Recognising the extreme promise of this discovery at Lake Callabonna, no hesitation was felt by the Museum Committee in subordinating all other work for a time to its vigorous prosecution. But for reasons, to which I have just alluded, excavations could only have been continued for a very limited time, had it not been for the very timely, generous, and unconditional assistance afforded by Sir Thomas Elder, G.C.M.G., a gentleman who stands conspicuous amongst Australian colonists for the liberal support he has so frequently and so munificently displayed in the interests of education and exploration in South Australia. This latest benefaction has enabled much to be done under undoubted difficulties, but much yet remains to be done, and it is hoped that, at a more favourable season, the work now for a time suspended may be resumed, to yield results still more favourable than those hitherto achieved. In the meantime the area comprising the lake has been reserved by the Government for the purposes of further exploration to be carried on under the authority and direction of the South Australian Museum.

KAFIRISTAN.

THE concluding meeting of the Royal Geographical Society for the present session was held on June 25, when a paper on Kafiristan was read by Surgeon-Major G. S. Robertson. Kafiristan is the least known part of Asia, and Dr. Robertson is the first European who has succeeded in penetrating its remote valleys, and making the acquaintance of the primitive tribes who dwell there.

Kafiristan is a geographical expression used to designate the country of those non-Mahomedan tribes who inhabit that space left blank in our maps, which is bounded on the east by Chitral and the Kunar valley, on the south-east by the Kunar valley, on the west by Afghanistan, and on the north by the Hindu Kush and by Badakhshan. Politically speaking, the whole region is bounded on the east by Chitral and the debatable land of the Kunar valley, and on all other sides by Afghan territory. All the rivers of Kafiristan drain into the Kabul river. The parts of this country explored during a year's stay included the Bashgul valley and many of its subsidiary valleys, from the head of which a passage was made to the Minjan valley of Badakhshan. The Kunar valley was also visited, and the valley known as Viron by the Mahomedans, and Presun by the Kafirs, was finally reached and found to be the most sacred part of this well-secluded country and the most interesting. Tribal jealousy made progress very difficult, but Dr. Robertson's journey and sojourn did not cost a single life, a very remarkable fact in a country where homicide is not regarded as criminal. All the passes leading into Kafiristan from Badakhshan are more than 15,000 feet in elevation, and internal communication between valley and valley is completely cut off in winter, when the various tribes live in absolute seclusion, each in its own district. The tracks which take the place of roads are narrow and difficult, running along the river valleys in many parts; they can only be traversed by experienced men; dogs cannot pass some of the difficult points without assistance.

The origin of the people is unknown. Classifying the tribes according to speech, there are, first, the Siah-Posh; secondly, the Wai, including probably the Ashkun; thirdly, the Presun. The Presun are certainly unlike all other Kafirs; they are possibly an aboriginal race. Dr. Robertson could never learn to repeat nor could remember one single word of their language; indeed, at their religious functions the sounds uttered by the officiating priests seemed more like a soft musical mewing than anything else.

Their customs are very peculiar and extremely primitive. One of the most curious is that a chief on his appointment, or anyone who excels in athletic exercise, does not receive tribute or reward, but is expected to feast all his neighbours as a thanksgiving for his exceptional distinction. The physique of the people was splendid, perfect muscular development being the rule, and fat men were quite unknown amongst them. They are great dancers, and have many ceremonial dances of much complexity. Funeral ceremonials are elaborate, and last a long time; but marriage is performed with the minimum of ceremony, the only essential being the payment of purchase-money to the bride's parents. The people were boastful, and at first it was impossible to get them to speak the truth on any subject; but they are brave to the last degree, and have maintained their independence for centuries against all comers.

A short paper was read at the same meeting by Mr. F. G. Jackson, describing the equipment of the Jackson-Harmsworth polar expedition and its proposed route.

SCIENTIFIC EDUCATION AND RESEARCH.[1]

ENGLISH boys and girls at the present day are the victims of excessive lesson learning, and are also falling a prey, in increasing numbers year by year, to the examination-demon, which threatens to become by far the most ruthless monster the world has ever known either in fact or in fable. Ask any teacher who has to do with students fresh from school his opinion of them: he will say that in the great majority of cases they have little if any power of helping themselves, little desire to learn about things, little if any observing power, little desire to reason on what they see or are called on to witness; that they are destitute of the sense of accuracy, and satisfied with any performance however slovenly; that, in short, they are neither inquisitive nor acquisitive, and as they too often are idle as well, the opportunities offered to them are blindly sacrificed. A considerable proportion undoubtedly are by nature mentally very feeble; but the larger number are by no means without ability, and are, in fact, victims of an acquired disease. We *must* find a remedy for this state of things, or perish in the face of the terrific competition now setting in. Boys and girls at school must be taught from the very earliest moment to *do* and to *appreciate*. It is of no use our teaching them merely *about* things, however interesting—no facts must be taught *without their use* being taught simultaneously; and, as far as possible, they must be led to discover the facts for themselves. Instead of our placing condensed summaries in their hands, we must lead them to use works of reference and acquire the habit of finding out; they must always be at work applying their knowledge and solving problems. It is a libel on the human race to say, as many do, that children cannot think and reason, and that they can only be taught facts; early childhood is the time at which these faculties are most apparent, and it is probably through failure to

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[1] Extracted from the Presidential address delivered by Dr. H. E. Armstrong, F.R.S., at the Chemical Society, on March 22.